

## INJURIES TO THE EYEBALL.\*

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The subject of injuries to the eyeball is one that is of interest, not to the ophthalmic surgeon alone, but to the general surgeon as well, for the majority of these cases are first seen by the general practitioner, and many of them will do as well in the care of the level-headed all-around-surgeon, as in the hands of a specialist. However, since oculists are becoming about as numerous as dentists, most surgeons find it convenient to place the more serious cases of injuries to the eyeball into the hands of specialists for treatment.

Among the more common accidents to an eyeball may be mentioned, foreign bodies lodged upon the surface, or imbedded in the substance of the cornea, small particles of steel, cast iron, emery, glass, wood, pearl, coal cinders, gun powder, small insects and other substances, too numerous to mention, which we are daily called upon to remove.

Since the introduction of cocaine, the deft little operation of removing a foreign body from the cornea, has, like many other operations upon the eye, and in fact, many operations in minor surgery, become a simple affair to the operator, and devoid of shock, pain and tediousness to the patient.

If the particle is simply adhering to the surface of the cornea, it can be easily swept off, after cocainizing the eye, by one instillation of a 4 per cent. solution of cocaine, by means of the flat spud, or by means of a small pledget of moistened absorbent

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\* Read before the Sixth Annual Meeting of the New York State Association of Railway Surgeons, held at the N. Y. Academy of Medicine, Nov. 17, 1896.

cotton twisted upon a probe or wooden toothpick. In this way they may be removed without scarcely touching the cornea or producing any abrasion of the epithelium.

Those that are more deeply imbedded or have seared their way into the corneal tissue, from striking the eye while hot, may be removed by means of the gouge-shaped spud, or by means of the point of a small bistoury. In using any of these instruments, anything like scraping should be avoided.

The patient should be seated, facing a good light in a chair with a head-rest, the eyeball steadied by the thumb and forefinger of the left hand. The speculum and fixation forceps are seldom, if ever required. If the foreign body is small and not readily seen, it is well to call an assistant to focus the light upon the cornea, by means of a large six inch reading lens. When the particle can be seen nicely the point of the gouge or bistoury can be inserted underneath it and the removal accomplished with a minimum amount of traumatism.

If the foreign body was sufficiently hot to burn the cornea, a small scale of charred corneal epithelium will frequently remain, and if not removed, cause nearly as much irritation as did the foreign substance itself. Many of these scales when removed present a ring-like appearance from having a transparent center.

After the removal of the foreign body, the slight wound in the cornea should be thoroughly swabbed with a saturated solution of boracic acid to wash away any septic material that might remain.

There are one or two points in regard to cocaineizing an eye that it might be well to mention in this connection. It is a well-known fact that cocaine acts very slowly and imperfectly, and in some cases not at all, upon a congested and inflamed eyeball, hence great difficulty is often experienced in producing sufficient anæsthesia to remove a foreign body from the surface of an eyeball in this condition.

To overcome this, I have frequently resorted to the constant application of iced cloths for one-half to one hour, and at the end of this time, found that anæsthesia was easily secured. Another method in these cases is to have the patient lie prone upon the back while instilling the cocaine solution.

Superficial cuts and abrasions of the cornea are received in a variety of ways. By flying pieces of iron, wood, glass and stone, and by edged and pointed tools, either in the hands of the recipient, or in the hands of a companion.

I will give two cases that illustrate this class of wounds. One, a carpenter, whose left eye I was obliged to enucleate several months previous, on account of panophthalmitis following a ragged and infected wound in the cornea, caused by a ten-penny nail that flew from beneath his hammer while he was at work. Soon after resuming his work and while he was engaged in using a hand saw, at some work, on a level with his eye, the saw suddenly "kinked" and the sharp points of several of the saw teeth were swept across the cornea, making several superficial cuts. Fortunately there was no infection, and under simple antiseptic treatment, the eye was entirely healed in three days.

The other case was a machinist who, while at work, thrust a good sized flat file into his left eye. The cornea received numerous abrasions, and the ocular conjunctiva was quite severely lacerated, and the whole eyeball was well smeared with greasy iron filings. All foreign substances were carefully removed and then the eye thoroughly irrigated with a warm boracic acid solution; the eye was then bandaged for twenty-four hours. Recovery was rapid and uneventful.

A drop of castor oil, after thoroughly washing, is often very soothing to eyes suffering from simple abrasion of the cornea. I have made use of a 4 per cent. solution of cocaine in castor oil in these cases.

The great difficulty experienced, however, in dissolving the cocaine in the oil, will prevent its being used in this manner very commonly. Abrasions of the cornea are sometimes received by the mother from the finger nails of a child at the breast. As the finger nail cannot be regarded as strictly aseptic, wounds to the eyeball produced thereby should always be viewed with suspicion. If the eye is cocainized and the abraded surface swabbed thoroughly with a 1-2,000 sublimate solution at the first visit, it may prevent much subsequent suffering to the patient and anxiety to the physician.

Burns of the cornea are among the common accidents to the eye ; caused by the eye being struck with heated metal objects and by caustic substances thrown into the eye. Superficial burns of the cornea are frequently received by ladies from thrusting the heated end of a curling iron into the eye while engaged in curling their bangs. A physician in our city referred a case to me recently, where nearly one-half of the cornea had been seared by coming in contact with a hot poker. The epithelium over this surface presented an appearance not unlike white tissue paper. Recovery was complete and perfect in three or four days.

As a rule these cases will require no further treatment than some soothing collyrium, and to be bandaged for a day or two. Burns that implicate both the ocular and palpebral conjunctiva will require careful attention to prevent adhesions from forming between them and presenting a condition known as symblepharon. Small adhesions can be broken up by means of a blunt probe. But when the adhesions are quite extensive, simply dividing them will be of no service, but a plastic operation to restore the lost tissue will be demanded.

Symblepharon is the common result of extensive burns by quick lime and chemicals of a caustic nature that are accidentally, and sometimes intentionally



thrown into the eyes by fiends in human shape. Burns from quick lime are met with more frequently than any others. In accidents of this sort all particles of unslacked lime should at once be removed, by means of small forceps, or with the spud or by wiping them out with pledgets of cotton. After all pieces are removed the eyes should be thoroughly irrigated with warm water slightly acidulated with acetic acid. Filling the eye with olive or castor oil, liquid albolene, melted lard, or any bland oleaginous substance that may be at hand, is good treatment, but should be deferred until all of the caustic material has been removed.

Ammonia may cause quite a burn, but this is more superficial than burns from lime. Sudden exposure of the cornea to the strong fumes of ammonia has been known to cause a desiccation of the corneal epithelium so extensive as to give the cornea the appearance of ground glass. Frequent instillations of a one per cent. solution of sulphate of atropine, together with the use of hot water and bandaging the eye, should be the treatment employed. Most of these cases recover without much impairment of vision.

Burns from sulphuric, nitric and acetic acids, from their quick chemical action, are about as damaging as lime. Those from melted metals, that occur among plumbers and gas fitters, do not produce as much destruction of tissue, from the fact that the metal cools so quickly. Burns of the cornea that have produced perforation will undoubtedly be complicated with a prolapse of the iris and all of the attendant dangers of a perforating wound of the cornea. Perforating wounds of the cornea and sclerotic are always dangerous. Their position and size, as well as the possibility or probability of some foreign body remaining in the globe, together with the danger of infection, that is ever present, are matters for serious consideration in treating these

cases. Fragments of wood, iron, steel, glass, and leaden shot are some of the more common missiles that perforate the cornea. Wounds from percussion caps, once so common, are now seldom encountered. Now and then it happens in civilized countries, that a case is met with where the cornea has been torn by the thumb nail in that worse than brutal practice of "gouging an eye" by those whose chief delight is the scrap and fight.

An injury thus produced recently came under my care at the hospital in our city. There was a crescent-shaped and perforating wound of the cornea of the right eye, seven or eight m.m. in length, along its upper border. From this wound nearly the whole of the badly lacerated iris was hanging, having been torn from its ciliary attachment almost bodily. I removed the entire membrane from the wound, and the eye slowly healed after several weeks of pain and inflammation, that led me more than once to urge the removal of the eye. A cataract was the result of the traumatism, yet to-day the eye is perfectly free from inflammation, and vision amounts to perception of light. When a perforation has occurred near the center of the cornea, and the pupillary border of the iris is entangled in the wound, an effort should be made to push it back by means of a blunt probe or a thin spatula. The mydriatic action of a 1 per cent. solution of sulph. atropine may be sufficient to disengage the iris. If these means fail, the protruding iris should be grasped with forceps, drawn out slightly, and snipped off with a pair of sharp scissors.

Perforation occurring near the margin of the cornea and attended with a prolapse of a small knuckle of iris, may be successfully treated by the use of the blunt probe and the instillation of a one-quarter of 1 per cent. solution of eserine, or a 1 per cent. solution of pilocarpine. These drugs by their well known properties of stimulating the ciliary muscle and the sphincter iridis, assist in drawing the iris away from the wound.

The fact that the anterior chamber has been emptied of the aqueous humor and the same escapes from the wound as fast as it reforms, and carries with it the greater part of the mydriatic or myotic solution that we may be using, will explain the frequent failure of these drugs to accomplish what is desired of them. Hence it is well not to squander too much time waiting for their action. If it is not prompt and decided, the protruding iris should be snipped off. A small coloboma or a hole in the iris is not a serious matter, compared with the dangers that may attend an adhesion of the iris to a wound in the cornea.

In all cases of perforating wounds of the eyeball, or in cases where no wound is discernible, but there is a history of the eye having been struck by some object, and the eye remains irritable, red and weak to the light, a thorough inspection should be made, both by focal illumination and by the use of the ophthalmoscope, to ascertain whether or not there may be a foreign body in the globe. When a foreign body has simply passed through the cornea, it can easily be seen resting upon the iris. If it has passed through the iris and into the lens, or into the vitreous chamber, the wound in the iris will be noticeable, and if the case is seen before much clouding of the lens has taken place, the ophthalmoscope can be used to locate the intruder.

When the foreign body is other than a piece of steel and iron, suitable forceps are about the only instrument that can be employed in removing it. If it is a fragment of iron or steel a powerful electro-magnet should be used, and if the case is seen soon after the receipt of the injury, the point of the magnet can be introduced through the wound, or it might be better to make another opening in the cornea when the foreign body can be seen resting upon the iris, if such procedure facilitates the use of the magnet.

In searching for pieces that have entered the

vitreous an opening may be made in the sclerotic to admit the point of the magnet. It should be made not less than eight m.m. from the limbus corneæ so as to avoid wounding the ciliary bodies. The point of the magnet may be passed through in the direction of the location of the foreign body, as previously ascertained by the use of the ophthalmoscope. Marvelous results are recorded of the salvation of eyes by the use of the electro-magnet. Fixed magnets are of no service. Electro-magnets of various shapes, size and power have been devised for the assistance of the ophthalmic surgeon.

There is one now in successful operation at the New York Eye and Ear Infirmary, corner of Second Avenue and Thirteenth Street, in this city, that is gigantic in size when viewed as an eye instrument. It is actuated by the Edison incandescent light circuit of 120 volts. Such a magnet possesses sufficient power at the apex of the cone to lift  $5\frac{3}{4}$  lbs. With 2 inch contact it will lift 16 lbs. When an eye that has become the unhappy possessor of a fragment of iron or steel is brought near the point of this magnet the presence and location of the metal is immediately made manifest by a bulging of the coats of the eyeball. These large magnets are at present too expensive for the average practitioner to have for his private office, but if their number could be multiplied, so that every city and town, of any considerable size might possess one, it would be a great boon to machinists and all workers in metals.

The removal of a foreign body does not always insure the salvation of the eye, as pan-ophthalmitis from infection may be the final outcome. Pieces of metal are often made aseptic by the heat, generated by the same blow that severed them and impelled them on their merciless errand. So shot and bullets are sterilized by the heat of the burning powder.

The position of a wound in the eyeball and the parts that are involved are all important factors in



determining for or against the saving of the injured member, and that too, without having it become a source of danger to the fellow eye. Wounds however extensive, wholly in the cornea, and healing without having the iris incarcerated in the cicatrix, seldom if ever excite sympathetic ophthalmia.

Perforating wounds that occur in the ciliary region, say 3 m.m. either way from the limbus corneæ, are in the danger zone. Such wounds from injuries that may occur to the ciliary bodies, are more productive of sympathetic ophthalmia, than wounds in any other part of the eyeball. Wounds in the sclerotic that do not reach into the danger zone are not especially dangerous to the eye, unless of course they are so extensive as to permit the escape of the greater part of the vitreous humor.

Quite free puncture of the sclerotic, for the purpose of allowing the escape of subretinal effusions, and to excite adhesive inflammation, is at present one of the best known and most frequently practiced methods of treating detachment of the retina.

Blows are frequently received upon the eyeball from some large weapon or missile, like the fist, or a large stone or ball, where the only result seems to be a partial or complete paralysis of the ciliary muscle. When this is slight the pupil will be dilated to about twice its natural size and there will be some loss of accommodation. When the paralysis is complete the pupil will be dilated ad. maximum and there will be entire loss of accommodation.

The mild cases tend towards recovery without any treatment, but it may be necessary to resort to electricity and strychnia when recovery is protracted. Blows of this sort sometimes produce inter-ocular hemorrhage from rupture of the choroid. Detachment of the retina may also be produced. Hemorrhage into the anterior chamber I have seen quite frequently where the force of the blow had caused a rupture of the iris. The traumatism may also be sufficient to cause iritis and even cyclitis.

Traumatic cataract, dislocation of the lens, and even rupture of the capsule of the lens, are sometimes the results of blows upon the eyeball. Such conditions will call for operative measures in the way of an extraction to relieve the ciliary bodies from the pressure caused by a dislocated and swollen lens.

**INTERNATIONAL**  
**JOURNAL**  
**OF**  
**SURGERY**

DEVOTED TO THE THEORY AND  
PRACTICE OF MODERN SURGERY AND GYNÆCOLOGY.

Vol. X.      January, 1897.      No. 1.

PUBLISHED MONTHLY BY  
**INTERNATIONAL JOURNAL OF SURGERY CO.,**  
106 and 108 FULTON STREET—Downing Building,  
P. O. Box 587.      NEW YORK, U. S. A.

SINGLE NUMBER 15<sup>cts</sup>, YEARLY SUBSCRIPTION \$1.00

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